

Cutting-Edge Science and Technology Help Safeguard National Security

Objective

Argonne National Laboratory strives to provide effective scientific and technical support to assist the U.S. Department of Energy (DOE) and other public agencies in accomplishing their mission to reduce threats to national security that result from the proliferation or use of weapons of mass destruction. In doing so, it also aims to protect the homeland from nuclear, chemical, or biological terrorist attacks.

Current National Security Programs

The Laboratory's research and development program includes three major components:

- Nuclear non-proliferation, treaty verification, arms control, and counter-terrorism technology;
- Domestic infrastructure assurance; and
- Chemical and biological counter-terrorism science and technology.

Nuclear Non-Proliferation, Treaty Verification, Arms Control, and Counter-Terrorism Technology

Based on the Laboratory's established expertise in nuclear fuel cycles and materials, this program aims to limit the spread of weapons of mass destruction and support nuclear-related counter-terrorism activities. It includes initiatives to research and test reactor security, reactor fuel safety projects, nuclear materials monitoring activities, and nuclear security training. In support of these efforts, Argonne is equipped to perform nuclear-related field and laboratory measurements, radiation dose estimations, decontamination, emergency construction, radioactive materials handling, nuclear risk management, and nuclear threat attribution.

The program includes both domestic and international components. Argonne provides technical assistance to help ensure the integrity of systems for controlling nuclear materials in the independent states that resulted from the dissolution of the former Soviet Union and in the nuclear-capable nations of South and Southeast Asia. The objective is to improve systems for monitoring, control, and export of nuclear materials, as well as for reactor decontamination and decommissioning. Argonne also aims to ensure the security and safe disposal of nuclear fuels and other materials that might be used in the manufacture of weapons.

These capabilities are equally applicable to homeland nuclear security. For example, the Laboratory is equipped to provide detectors for identifying facilities, equipment, and containers used to make, handle, or conceal nuclear materials. For the DOE Region V Radiological Assistance Program, Argonne staff provide technical advice, training, expertise, and equipment, as well as monitoring and assessment support for the mitigation of immediate radiation hazards and risks to workers, the public, and the environment due to radiation emergencies and incidents. This regional role involves close collaboration with local governments and federal agencies, such as the Federal Bureau of Investigation.

Domestic Infrastructure Assurance

Argonne's infrastructure research, technology, and assessment program aims to ensure the security of critical U.S. infrastructures and the safety of associated populations. The program leverages Argonne's expertise, knowledge, technologies, and specialized research facilities to meet infrastructure assurance needs at the local, regional, and national levels. The effort encompasses vulnerability assessments focused

on physical, operational, and cyber security, and the interdependencies of such critical infrastructures as electrical, natural gas, transportation, and telecommunication systems. The program addresses the potential for cascading impacts resulting from disruptions to one or more types of infrastructure, methods of detecting events affected by interdependencies, and improved technology and procedures for preventing and recovering from such events.

Under the sponsorship of DOE and the Federal Emergency Management Agency, Argonne is actively engaged in infrastructure outreach activities that aim to increase the emergency preparedness and security awareness of infrastructure owners and operators and their host communities and states. These activities promote the sharing of best practices and lessons learned. A community critical infrastructure protection project involves collaboration with communities and local utilities to develop plans and procedures for municipalities to prevent or recover from major disruptions to energy infrastructures (e.g., natural gas supply systems). The Laboratory led a study of the infrastructure interdependencies associated with the attack on the World Trade Center and provided infrastructure assurance support for the Olympic games in Utah. In the Chicago metropolitan area, Argonne, in partnership with the Commonwealth Edison Company, the City of Chicago, 270 surrounding municipalities, and three pilot communities, developed comprehensive guidelines for addressing electric power system disruptions; the results have been applied in other states and regions.

Chemical and Biological Counter-Terrorism Science and Technology

Within the framework of its basic and applied research programs, the Laboratory is equipped to address potential chemical and biological threats. Resident capabilities include instruments and sensors for detection of chemical and biological agents in the air, water, and soil, whether dispersed over kilometers or hidden within sites and caches. Facilities are also available for evaluating the effectiveness of monitoring methods at both the laboratory and field scales. The Laboratory can provide technical assistance in emergency situations and deploy fast-response systems for protecting first responders, decreasing exposure times, estimating population exposures, and reducing risk. Under the sponsorship of DOE and the U.S. Department of Defense, the Laboratory developed portable biochip microarrays capable of detecting and identifying anthrax and other bioagents. For the Joint Chemical Aid Detector Program, the Laboratory developed a handheld cyanide-gas microsensor. In partnership with other laboratories, Argonne is demonstrating technologies for mitigating impacts from chemical and biological attacks on interior infrastructures deemed to be at high risk, such as subways, airports, and public buildings. The Laboratory also participates in the U.S. Army program for assessing environmental risks associated with chemical agents.

Argonne's Advanced Photon Source includes a unique structural biology facility that can provide information required to support the development of pharmaceuticals. Facilities also exist for determining the health and environmental risks from the dispersion of chemical and biological agents and for evaluating their potential effects on populations and materials.

Sponsors

U.S. Departments of Energy, Defense,
Transportation, and Agriculture
Defense Threat Reduction Agency
Federal Emergency Management Agency
U.S. Environmental Protection Agency
Defense Advanced Research Projects Agency

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